Where should the pharmacy researcher look first? comparing International Pharmaceutical Abstracts and MEDLINE*

By Diane L. Fishman, M.L.S.
Manager, Reference and Information
Management Services
Health Sciences Library

Virginia L. Stone, M.L.S.
Information Specialist
Health Sciences Library

Bethany A. DiPaula, PharmD.
Director of Pharmacy
Walter P. Carter Center

University of Maryland at Baltimore
Baltimore, Maryland 21201

This study compared the usefulness of various CD-ROM versions of International Pharmaceutical Abstracts (IPA) and MEDLINE for pharmacy research. Journal coverage as well as the strengths and weaknesses of database structure and contents were considered. The journals indexed in each database were compared to those identified in a survey of the research journals most important to University of Maryland at Baltimore pharmacy faculty and in a similar North Carolina study rating pharmacy journals. In addition, indexed journals were checked against the Institute for Scientific Information's most recent list of high-impact journals in pharmacology and pharmacy. Searches representing a variety of topics relevant to pharmacy were conducted in both databases, and the number and relevance of citations located were analyzed. Results showed that IPA indexed a greater number of pharmacy titles, but that MEDLINE indexed more pharmacy journals designated in studies as significant to the field. There was little overlap in coverage between the two databases. MEDLINE produced larger retrievals for the majority of questions, but many citations retrieved in IPA did not appear in MEDLINE.

INTRODUCTION

With the abundance of databases now available in many libraries, patrons often come to the reference desk for guidance in selecting the best databases for their searches. Librarians frequently must rely on professional intuition when deciding which database is likely to contain the most relevant information. How does one decide, for example, whether searching a second database will waste time and money or retrieve important citations not present in the first database? Insights about this issue would be useful to pass on to students in class instruction or individual consultations.

Unfortunately, little attention has been given to finding answers to such questions and almost no related research has dealt with the field of pharmacy, the focus of this paper. Previous health-related research on these issues has concentrated primarily on comparing MEDLINE with the Cumulative Index to Nursing and Allied Health Literature (CINAHL). The study reported here investigated the strengths and weaknesses of MEDLINE and International Pharmaceutical Abstracts (IPA) in meeting the needs of the pharmacy researcher.

IPA offers worldwide coverage of the pharmacy literature, including pharmacy practice, and selected

Approximately 800 journals are indexed and abstracted by pharmacists. IPA also includes coverage of state pharmacy journals and cosmetic journals. Abstracts of ASHP meetings (since 1988) and meetings of the American Association of College Pharmacists and the American Pharmacy Association are also indexed. Eventually, approved masters and doctoral theses from schools of pharmacy will be added to the database.

The MEDLINE database is produced by the National Library of Medicine and includes substantive articles from more than 3,700 biomedical journals. The database covers the fields of medicine, nursing, dentistry, veterinary medicine, and the preclinical sciences. MEDLINE indexes articles published from 1966 to the present, and includes authors' abstracts with indexed articles. In the current file, approximately 70% of the articles have abstracts. IPA indexes provide structured abstracts for all articles within the database.

Although both IPA and MEDLINE use subject descriptors, MEDLINE has the benefit of a more thorough indexing scheme. This approach allows users to "explode" topics, selecting broader as well as narrower related subjects in one step. Subheadings focus selections using a predetermined set of terms. In contrast, IPA double indexes articles on drugs at both the individual drug and class levels. However, IPA does not classify non-drug subject concepts. Instead of using subheadings, IPA pairs its controlled vocabulary terms (for example, toxicity is paired with ranitidine) and adds a tertiary natural language descriptor.

**LITERATURE REVIEW**

Several authors have compared indexing and abstracting sources for pharmacy information. These studies discussed relative merits of print versus online searching. Articles by Perry [1], Kruse [2], and Ritchey [3] described available online sources. Tousignant considered problems in database searching for pharmacy information and examined the editorial practices of IPA and its usefulness for pharmaceutical researchers. He compared overlap between IPA records and coverage in the Biosis, CA Search, Excerpta Medica, MEDLINE, and SCISEARCH databases [4]. Studies by Van Putte [5] and Snow [6] evaluated retrieval of pharmaceutical information in several online databases, including MEDLINE, Biosis, and Excerpta Medica. In an earlier study, five information sources (MEDLINE, IPA, *de Haen's Drugs in Use*, Iowa Drug Information Service, and *Index Medicus*) were compared on the basis of drug information retrieved. Except for MEDLINE, all of the indexes were print sources. Searching *de Haen's Drugs in Use*, IPA, and *Index Medicus* resulted in the most comprehensive search with the fewest duplicate records [7].

With respect to CD-ROM searching, several studies have compared MEDLINE with databases other than IPA, primarily CINAHL. Results of these studies have been mixed and suggest that the type of question searched determines which database provides the best retrieval. In Okuma's comparison, results indicated that CINAHL provided more precise and appropriate coverage of the nursing literature than did MEDLINE, but that MEDLINE should also be consulted for comprehensive searches because it provided unique citations [8].

Burnam and Shearer compared CINAHL and MEDLINE on CD-ROM with EMBASE on Dialog on the basis of utility to the nurse researcher. For nursing care literature, CINAHL and MEDLINE provided the most useful articles. CINAHL searches resulted in the most relevant articles when the topics were multidisciplinary and did not involve clinical care. MEDLINE and EMBASE provided better results when searching topics were not restricted to nursing care [9].

Watson and Perrin's comparison of CINAHL and MEDLINE on CD-ROM concentrated on their use in four allied health areas. As in other studies, searching of both CINAHL and MEDLINE proved useful when seeking complete coverage of a topic. Each database provided coverage of unique journals, and unique citations were retrieved from each [10].

Likewise, studies of the psychological literature indicate that more than one database should be searched when comprehensive information is needed. Hsu compared CD-ROM versions of MEDLINE, PsycINFO, and PsycLIT. Findings indicated that, because the three databases differed in content, searching should be conducted in all of them to achieve complete retrieval. PsycLIT and ClinPSYC were found to be particularly useful for mental health professionals [11]. King noted that user satisfaction was high when searching MEDLINE and PsycLIT on CD-ROM [12].

**METHODODOLOGY**

Two measures of a good index are the quality of the journals indexed and the number of relevant citations retrieved when searching. Both criteria were incorporated into this study.

**Measures of journal quality**

Many more journals are indexed in MEDLINE than in IPA (approximately 3,600 versus 800). However, because IPA restricts its coverage to pharmacy topics...
and MEDLINE does not, it is difficult to establish which database indexes a higher number of pharmacy-related journals. Further, quantity does not always indicate quality. Still, the authors felt it was important to determine which database indexed the journals most important to pharmacy researchers. To answer this question, IPA and MEDLINE were checked against a variety of standards.

The databases were compared on the basis of both the number of pharmacy journals covered and the degree of overlap. Unfortunately, there is no subject index to MEDLINE’s List of Serials Indexed for Online Users [13]. To make some judgment about coverage, the authors first compiled a list of all journals under pharmacy classifications (antibiotics, drug therapy, pharmacology, pharmacy, toxicology, and psychopharmacology) in the List of Journals Indexed in Index Medicus [14]. These were cross-checked against the titles in Journals Abstracted by International Pharmaceutical Abstracts [15], which appears annually in the January 15 print issue of IPA. For both sources, 1994 editions were used. All the titles listed in IPA were also cross-checked against MEDLINE, because some of these titles (e.g., JAMA) did not appear in the pharmacy subject sections of List of Journals Indexed in Index Medicus but were in MEDLINE.

To establish the quality of the sources covered, several instruments were used. As part of a September 1994 survey of University of Maryland at Baltimore (UMAB) pharmacy faculty, respondents were asked to list what they considered to be the five most important journals in their field. Thirty-four faculty members returned questionnaires and identified 103 unique titles. These were compiled and checked against the 1994 Journals Abstracted by International Pharmaceutical Abstracts and, for MEDLINE, the List of Serials Indexed for Online Users.

A survey similar to UMAB’s had been carried out in 1986 at the University of North Carolina (UNC), where senior faculty were asked to rate pharmacy journals that they considered important [16]. All journal titles that received a high or medium importance ranking in the UNC survey were compiled and checked against the titles indexed in IPA and MEDLINE. No attempt was made to adjust the results for title changes, so some overlap may have been missed.

Finally, the high-impact-factor journals listed in Science Citation Index’s Journal Citation Reports section on pharmacy and pharmacology [17] were checked against the journals listed in IPA and MEDLINE. The impact factor indicates the number of times a journal has been cited in a given year.

The data collected from checking the lists against each instrument were analyzed according to both how many journals on each master list were indexed in IPA and MEDLINE and how many titles were unique to only one of the two sources.

Measures of search performance

To examine how IPA and MEDLINE compared in more practical terms, ten questions were selected that were similar to pharmacy questions frequently encountered in an academic health sciences library. The authors tried to choose questions from many aspects of pharmacy research: clinical, pharmacokinetics, and substance abuse issues among them. The questions were tailored to make retrieval manageable for analysis (fifty or fewer citations per search). Searches were then executed by using the SilverPlatter version of IPA and the Ovid version of MEDLINE. These were the platforms in use at the University of Maryland at Baltimore, where the study took place. Ideally, the same search engine would have been used for both databases, but at the time of the study, IPA was produced in CD-ROM only by SilverPlatter. In mid-1995, it also became available through OVID.

Fortunately, a recent comparison of the MEDLINE databases in SilverPlatter and Ovid formats [18] revealed that, while there are differences in the search fields to which the systems default, the database is basically the same in both platforms. The search procedure used to choose Medical Subject Headings (MeSH) or textwords may differ; however, searching both MeSH terms and textwords should result in the same retrieval regardless of platform.

One concern was the variation in update frequency between SilverPlatter and OVID. Although MEDLINE was available monthly in both platforms, the SilverPlatter IPA was updated quarterly, versus monthly updates for the new OVID IPA. To compensate for these differences, the authors rechecked the most recent of the retrieved MEDLINE citations to see if they could be located in IPA during the following quarterly update.

When searching, librarians typically make use of the best features of each system (e.g., the explode capabilities of MEDLINE). Therefore, the authors collaborated to select the best search strategy for each database for each question. The SilverPlatter version of IPA did not include IPA’s thesaurus (OVID promises that a graphical thesaurus will be implemented soon in that platform). Therefore, the thesaurus features and cross-references were not available for searching. However, because the IPA thesaurus lacks the explode feature and because subject descriptors are applied to each record in IPA and are textword searchable, the print IPA thesaurus could be used easily to guide searching. After the searches were executed in both databases, the authors reviewed the results for relevance.

The questions used in the study, with accompanying search strategies, are listed in the Appendix. For each topic, MEDLINE was searched by using MeSH terms where possible and textword searching
where appropriate. Free-text searching was used in IPA because this strategy would search the words in subject descriptors as well as elsewhere in the record. Because hierarchical exploded were not possible in IPA and the authors were manually removing irrelevant retrieval, there would have been no advantage to searching descriptors separately. Searches were performed in both databases on the same day and were generally limited to the same time period, 1990 to mid-1994. The exact closing date varied because the searches were conducted over several months.

Finally, sample questions were analyzed to determine why citations retrieved from one index were not included in the other. The authors wanted to learn whether records were not retrieved primarily because of differences in coverage or whether other factors, such as searching techniques and indexing, played a role.

RESULTS

Measures of journal quality

Two hundred six journal titles from MEDLINE and 471 from IPA were identified. Of these, 76.9% were listed only in IPA and 74.8% were unique to MEDLINE, suggesting that the degree of journal overlap between the databases was small. Most of the journals indexed only in IPA were foreign titles, journals of state associations, or drug industry journals such as Drug Topics or Journal of Pharmacy Technology. It is more difficult to characterize the titles indexed only in MEDLINE. Again, the majority were published abroad. However, many others, such as Pharmacological Reviews and Targeted Diagnosis and Therapy, were produced in the United States. Table 1 summarizes the results of the other comparisons.

Measures of search performance

Table 2 illustrates the number of relevant, unique, and overlapping citations derived after searching MEDLINE and IPA in an attempt to answer various questions. The numbers cited refer to relevant articles located, not to the raw retrieval from the search strategy. MEDLINE was particularly useful in obtaining clinically oriented citations. For instance, MEDLINE produced a greater number of relevant and unique listings than did IPA on topics such as disease therapy (thirty-two versus one), substance abuse (twenty-seven versus one), clinical drug trials (six versus zero), and drug side effect profiles (five versus two). However, IPA seemed to be more useful when searching for information on pharmacy-specific areas such as research on drug mechanism of action (five versus two), pharmacy education (three versus zero), or pre-scription compounding (one versus zero). Both databases seemed well suited to identifying articles about the cost of therapy and pharmacokinetics.

Reasons for inconsistent retrieval

Several questions were analyzed to see why citations had been retrieved in one database and not the other. Table 3 summarizes the results.

DISCUSSION

Although there was a high degree of agreement on article relevance among the three authors, it was not complete; this was due primarily to differences in interpretation. In a real setting, a patron would be asked to clarify the context. To achieve consensus for the study, at least two of the authors had to agree that the article was relevant before it was included for final analysis. The results were then compared on the basis of both number of relevant articles and degree of overlap.

It is interesting to note that 7% to 15% of the journals identified as important to pharmacy by the three standards were indexed in neither MEDLINE nor IPA. Obviously, a thorough researcher must go beyond these two major databases to perform a complete search.
of the most important literature in the field. The results also suggest that, although MEDLINE does not specialize in pharmacy and IPA indexes more pharmacy titles, considerably more of the journals identified by studies as being significant in the field were indexed in MEDLINE than in IPA (76.7% versus 34.9%). Although there is some overlap in titles between the indexes, the majority of pharmacy titles indexed in MEDLINE were not covered by IPA. At the same time, 20% to 25% of the titles on the survey lists were indexed only by IPA and did not appear in MEDLINE. Therefore, IPA certainly cannot be ignored when trying to provide a complete overview of the literature. Indeed, sometimes IPA would be the preferred source.

According to the analysis of ten questions, both IPA and MEDLINE seem to provide advantages and disadvantages to the user. Librarians currently using IPA for most of their searches should consider MEDLINE for the following reasons:

- **MEDLINE** retrieved a greater number of relevant articles in seven of the ten questions.
- **MEDLINE** cross-indexes comments, retractions, and other additions. These connecting links are not available in IPA.
- If concepts need to be exploded, then **MEDLINE** is obviously superior. IPA tries to double-index at both the individual drug and class levels. However, this feature will not help if the search requires non-drug concepts. For example, to search drugs used for all types of eating disorders, the IPA user would need to remember to enter each form of eating disorder (bulimia, anorexia, etc.).
- Because IPA provides original abstracting for each record included, a time lag in indexing is inevitable. Frequently the time lag seems excessive. Five articles that, according to the lists of journals covered, should have been retrieved from both indexes, still had not appeared in IPA almost six months after being retrieved from MEDLINE. Of course, tardiness may not be the only reason, because several titles had been dropped by IPA.
- **IPA**'s selection policy for inclusion can be difficult to follow. The policy is considerably more restrictive for articles in medical journals. For example, according to the IPA editorial staff, only letters dealing with toxicity are included. However, a letter of rebuttal dealing with toxicity would be included in IPA only if it appeared in a pharmacy journal and not in a medical journal. Similarly, animal studies are indexed in IPA only if they appear in a pharmacy journal.

On the other hand, librarians who routinely direct patrons to **MEDLINE** should consider IPA in the following situations:

- **IPA** performed better than **MEDLINE** for certain types of searches: questions dealing with pharmacy as a profession; brand name searches (it adds brand name descriptors to relevant articles, much as EMBASE does); and pharmaceutics questions dealing with topics such as compounding.
- All records in IPA include an abstract, while only 70% of MEDLINE sources do. **MEDLINE** does not provide an abstract if the author has not included one with the article or if the journal publisher denies **MEDLINE** permission to display it.
- Even if the author's abstract appears in **MEDLINE**, users may want to consult the abstract in **IPA**. The article may not be easily available, and the abstract provided by the professional indexer at **IPA** may supply enough additional information to answer a specific question.

This study was admittedly brief. Comparisons of the indexes on the basis of subject strengths are essentially based on one question and may not prove valid. For instance, due to experience before the study, the authors felt that **IPA** would provide better re-
trieval than MEDLINE for pharmacokinetics questions and pharmacy business issues. However, with the questions used, MEDLINE actually performed slightly better.

Another possible problem in methodology is subject bias. After regrouping the questions by the database in which the most information was found, it became apparent that two of the three questions that were answered most effectively in MEDLINE dealt with the psychopharmacologic aspects of drugs. Was the nature of the questions skewing the results? Specifically, did MEDLINE simply index more psychological journals than IPA, and was it this effect that was being measured? To find out, the authors substituted two questions that were in the same subject area but dealt with drugs treating other clinical problems. These questions are listed at the end of the Appendix.

The retrieval in the substitute searches covered the time period from 1992 to 1996 and was not examined for relevancy. However, in both cases, the new questions retrieved many more citations in MEDLINE than in IPA. This retrieval mirrored the findings for the psychopharmacologic questions. Therefore, the authors assume that type of drug or condition chosen did not substantially influence the findings of the study. On the other hand, to create manageable sets to study, the authors did tailor test questions to ensure relatively low retrieval. Choosing such specific questions, while convenient, could conceivably have biased the results.

Of course, a thorough literature review might entail searching not only IPA and MEDLINE but also a number of other databases, including EMBASE or Micromedex CCIS. However, IPA and MEDLINE are two relatively inexpensive databases that are available in CD-ROM format in many libraries. Therefore, it is especially useful to compare their strengths and weaknesses.

CONCLUSIONS

Both IPA and MEDLINE can offer advantages, depending on the topic the pharmacy researcher needs to explore. Before starting a search, information specialists should examine the descriptors in both indexes to determine which database is more appropriate to the search. For example, “clinical trials” is a heading in MEDLINE but not in IPA while “mechanism of action” is a heading in IPA but not in MEDLINE. The existence of a relevant descriptor makes it more likely that articles on the subject will be retrievable. For those interested in retrieving citations for letters, the choice is unclear. If the citation is available in IPA, then using that source will provide the additional benefit of an abstract. However, if the letter does not appear in a pharmacological journal and does not deal with toxicity, then it will not appear IPA at all.

Even more important to the pharmacy researcher is the degree of unique retrievals provided by each database. Approximately 67% of the relevant articles retrieved in IPA did not appear in the corresponding MEDLINE search, and approximately 88% of the articles located through MEDLINE were not retrieved in IPA. Thus, wherever pharmacy researchers choose to look first, thorough searchers will find their time well spent if they consult both MEDLINE and IPA.

REFERENCES

APPENDIX

Questions and search strategies used in the study

1. Disease therapy
You need articles on the new antipsychotic drug, risperidone, to treat schizophrenia.
MEDLINE—(risperidone (tw) or risperd (mh) or 106266-06-2) and (schizophrenia (mh) or schizophrenia (tw))
IPA—(risperidone or 106266-06-2) and schizophrenia:

2. Substance abuse
Find articles on using clonidine, a drug ordinarily used to treat hypertension, to treat heroin (diacetylmorphine) addiction.
MEDLINE—(clonidine (mh) or 4205-90-7) and heroin dependence (mh) or diacetylmorphine (mh) or heroin (tw)
IPA—(clonidine or 4205-90-7) and (diacetylmorphine or heroin):

3. Clinical drug trials for disease
Find articles on drugs undergoing clinical trials for use with borderline personality disorder patients
MEDLINE—borderline personality disorder/subheading drug therapy (limit to clinical trial or clinical trial, phase I or clinical trial, phase II or clinical trial, phase III or clinical trial, phase IV or controlled clinical trial or multicenter study) or (borderline personality disorder/subheading drug therapy and exp clinical trials) or (borderline personality disorder/subheading drug therapy and (clinical (tw) or random: (tw) or multicenter: (tw)) and (study (tw) or studies (tw) or trial: (tw) or test: (tw))
IPA—borderline nearl (personalit: or state:) and (clinical or randomized or multicenter) and (study or studies or trial: or test:).

4. Side effects of drug
What are the gastrointestinal side effects of cyclosporine?
MEDLINE—(cyclosporine/ae, to, po and (exp gastrointestinal system or exp gastrointestinal diseases))
IPA—cyclosporine and (gastrointestinal or diarrhea or ulcer: or constipation or colitis) and (adverse or side)

5. Brand name drugs
Find information on Aleve, the new over-the-counter version of naproxen.
MEDLINE—aleve (tw) or (naproxen (mh) and drugs, nonprescription (mh))
IPA—aleve or (naproxen and (over-the-counter or non-prescription or nonprescription))

6. Cost of therapy
What are the most cost-effective thrombolytic therapies for emergency situations?
MEDLINE—exp fibroinolytic agents (mh) or thrombolytic therapy (mh) and (costs and cost analysis (mh) or cost: (tw) and exp emergency medical services
IPA—(brinolase or heparin or hirudin or plasmin or plasminogen or reptilase or streptokinase or fibrinolytic or thrombolytic) and cost: and emergenc:

7. Bioavailability
Find articles on the bioavailability of gabapentin (an epilepsy drug).
MEDLINE—gabapentin (tw) and (biological availability (mh) or bioavailability (tw) or pk, fs or exp pharmacokinetics)
IPA gabapentin and (bioavailability or pharmacokinetics or biological availability)

8. Mechanism of action
What is the mechanism of action of solotol?
MEDLINE—solotol (mh) and mechanism of action (tw)
IPA: solotol and mechanism of action:

9. Pharmacy education
Find articles on the career satisfaction of pharmacists who graduate with a PharmD degree.
MEDLINE—education, pharmacy, graduate (mh) or pharmd (tw) or pharm d (tw) and (job satisfaction (mh) or (career: or job: (tw) and satisf: (tw))
IPA—(pharm or pharm d) and (career: or job) and satisf:

10. Compounding
A client has heard of an analgesic which comes in stick form. He knows that it contains methyl salicylate and menthol but he doesn’t know how to compound it. Can you help?
MEDLINE—((methyl (tw) adj salicylate (tw)) and menthol (mh) and (drug compounding (mh) or compound: (tw)) or (exp salyculates (mh) and drug compounding (mh))
IPA—methyl salicylate and menthol and compound:

Substitute Questions
1. The question on disease therapy became: Find articles on acadesine (a new drug used to improve myocardial protection in coronary bypass grafting).
MEDLINE—acadesine (tw)
IPA—acadesine
Results: MEDLINE 29 IPA 3

2. The question on clinical trials of drugs to treat a disease became: Find clinical studies on drugs used to treat lung cancer.
MEDLINE—(exp lung neoplasms/dt limit to clinical trial or clinical trial phase I . . .) or (exp lung neoplasms/dt and exp clinical trials)
IPA—(pulmonary or lung) and (cancer or neoplasm:) and (clinical and (trial: or study or studies or test:))
Results: MEDLINE 766 IPA 30

* The search statements are summaries of search strategy rather than a literal translation of the search. For example, truncation is indicated uniformly by a colon rather than the appropriate truncation codes for the platform ($ in OVID's MEDLINE and * in the Silver Platter IPA).